MATH 225
Linear Algebra and Differential Equations
2019-2020 Spring
Project 1

DUE DATE: April 6, Monday before the midnight.

QUESTIONS:

1)(20 pts.) For what values of k, if any, is the vector $(k^2, -3k, -2) \in \mathbb{R}^3$ in the span of $\{(1,2,3),(0,1,1),(1,3,4)\}$?

2) Let

$$A = \begin{pmatrix} 1 & 3 & 15 & 7 & -2 & 0 \\ 2 & 4 & 22 & 8 & 3 & 1 \\ 2 & 7 & 34 & 17 & -1 & 3 \end{pmatrix}$$

be given.
(a)(10 pts.) Find the reduced echelon form of A.
(b)(5 pts.) Find a basis for the $Row(A)$.
(c)(5 pts.) Find a basis for the $Col(A)$.
(d)(5 pts.) Find a basis for the $Null(A)$.
(e)(5 pts.) What are the rank and nullity of A?

3) Let W be a subspace of $\mathbb{R}^5$ is spanned by the vectors

$$v_1 = (1,3,-1,2,3),\ v_2 = (2,7,-2,5,2),\ v_3 = (1,4,-1,3,-1)$$

(a)(10 pts.) Find a basis for W . What is the $dim(W)$?
(b)(10 pts.) Find a basis for the orthogonal complement $W^{\perp}$ of W. What is the $dim(W^{\perp})$?

IMPORTANT:

1.This project consists of 3 questions of different weights.
2.Don't forget to write your Name, Lastname, Department, Section and Student ID on the 1st page of your project.
3.You must show all your work in well-organized English or mathematical sentences, and explain your reasoning carefully.
4.Your project must be hand written. The projects written by latex or word etc. will not be accepted.
5. You must submit your project as a 1 pdf file.